

JETRO
Japan External Trade Organization
Japanese Environmental Market Report
1999

Waste Treatment
and
Recycling Technology

1. Market Trends

Following the UN Environment Development Conference 1992 in Rio De Janeiro (Global Summit), Concern about the global environment has grown up a great deal. Though flagging the sustainable development, concern about the environmental problem is becoming a very important issue in the world. In Japan, following with the modern social system of mass production, mass consumption and subsequent mass wastes, a serious problem for disposition of the garbage and wastes was brought up, and a conversion for recycling of the resources became quite important. According to the [Research about Settlement of Global Environmental Problems] carried by Tokyo Metropolitan Environment Study Institution covering the small and medium corporations (of 2,592 no industrial firms in Oct 1996), the [Extermination of Wasted] and [Recycling of Office Rubbishes] ranked No 1 and No 2 for settlement of the problems.

The industrial market of disposition of the wasted and recycling is now more than a half of the environment business and becomes one of the largest industrial markets.

1) Industrial wasted rubbish and recycling

The wasted rubbish are classified either the household wasted rubbishes of each home or the industrial wasted rubbishes of industrial corporations. The law concerning [Cleaning and Disposition of the Wasted Rubbishes], there are nineteen rubbish items (of cinders, mud, wasted oils, wasted oxygen, wasted alucarium, wasted plastic goods, wasted papers, wasted timbers, wasted textiles, rottens of plants and animals, wasted rubbers, wasted steels, wasted glasses and wares, wasted irons, wasted construction goods, excrements of animals, dead bodies of animals, and the dusts) are designated as the industrial wastes, and the rest are designated as the general wasted items. Many wasted rubbish of companies are the [Industrial Wasted Items], and the rest of items out of companies and tems from the household goods are the [General Rubbish Items]. Quantity of the industrial wasted items were 39,400 tons in 1995 which was 8 holds more the general wasted rubbish. Rubbish of both categories is running unabated in the recent years.

In addition under the Law, there is another [Special Care Wasted Items] of poisonous, epidemical rubbish of medicines and explosive rubbish.

The reason of classification of the industrial wasted rubbish and general rubbish is to charge management responsibility of the rubbish, the local governments are responsible for the general rubbish and the industrial rubbish must be taken responsibility by the expositors.

Volume Statistics of Wasted Rubbish

	1990	0991	1992	1993	1994	1995
Industrial Rubbish	39,500	39,800	40,300	39,700	40,500	39,400
General Rubbish	5,044	5,077	5,020	5,030	5,054	5,069

Sources: Welfare Ministry [Exposition and Disposition of Industrial Rubbish]
[Exposition and Disposition of General Rubbish]

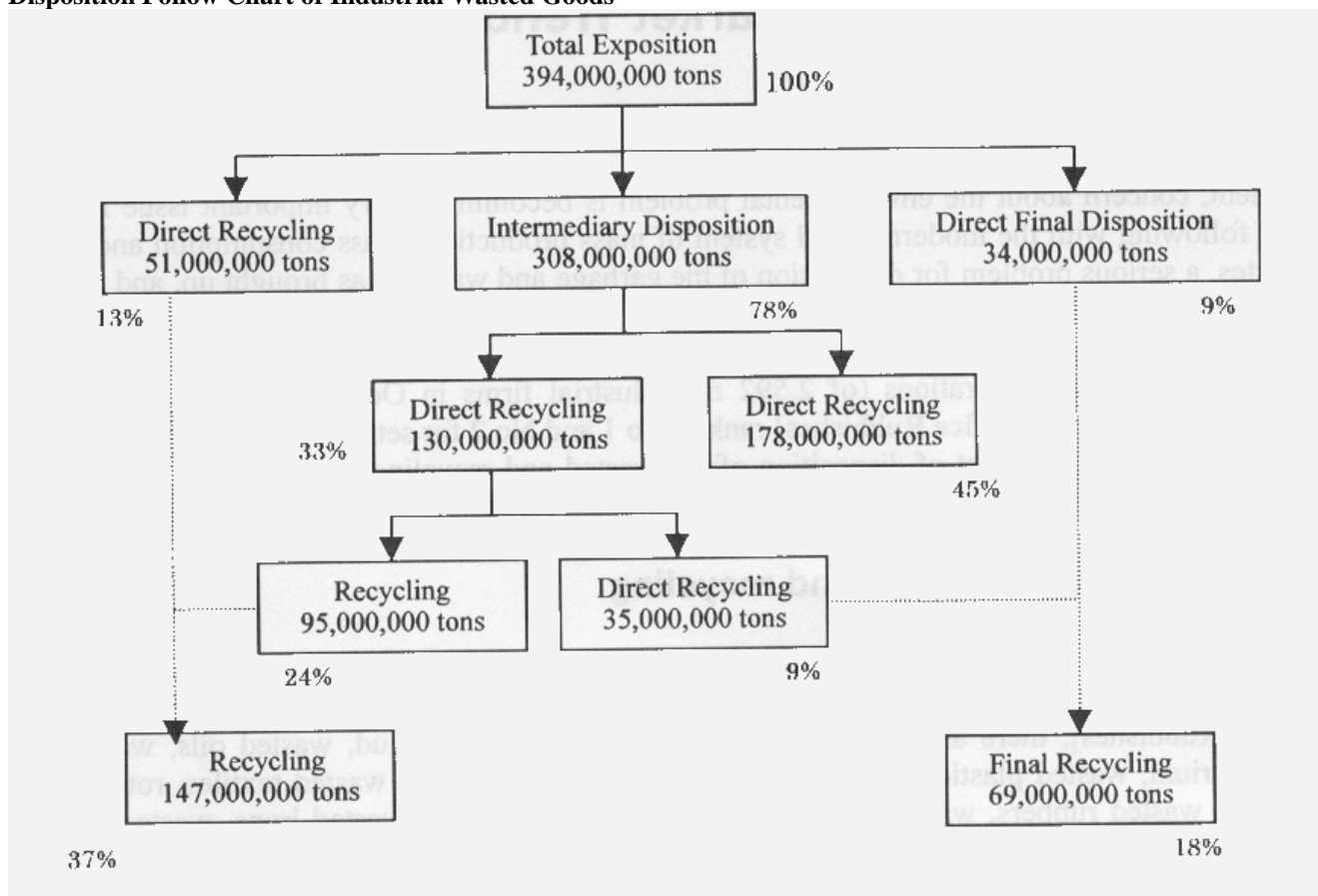
Among the industrial rubbish exposition quantity of 39,400 tons in 1995, the intermediary disposition is 45% and 37% are recycled, and whereas the ultimate disposition ratio was 18% at that year, it's been reduced each year thereafter.

Exposition ratio by category, the muds are the largest item and seizes 475 of the total, and followed by the excrements (at 19%), the construction wasted goods (15%). These three items occuppies 80% of the total expositions.

The high recycling items of wasted rubbish are the iron wasted goods (79%), steel wasted goods (78%), animal excrements (73%), construction wasted goods(70%), and followed by the plants and animal abandoned(60%). On the contrary, the lower recycling wasted items are the wasted alucarium (5%), muds (7%), and followed by the wasted rubbers (15%). The industrial wasted goods for the final disposition are (1) muds (2) iron wasted goods (3) construction wasted goods (4) wasted glasses and wares (5) excrements of animals and (6) wasted plastic goods. There are 2,732 plants for the final disposition all over Japan, and there are such a large accumulated quantity of more than 3 years (of remaining number of years for the final disposition) throughout Japan (Metropolitan area, however, 1.1 years). It is still amounting accumulation and said to be a serious problem.

For prolongation of the final disposition plants, the recycling of the wasted goods and reduction of those goods is becoming important.

Disposition Follow Chart of Industrial Wasted Goods



Source: Ministry of Health and Welfare, Survey on Industrial Wasted Rubbish.

Looking at the present situation of recycling of the industrial wasted goods, the muds can be classified into the muds of organics, non organic muds (sludge) and the drainage muds. The organic muds can be recycled into the organic fertilizers or solid fuels, the non-organic muds can be changed into crude cement or retrieval of the iron, and the drainage muds can be used for re-fertilization of farm land or the construction materials. The muds in general absorb water and need dehydration or desiccant before recycling or disposition.

The steel slubs which is more than 80% of the iron wasted goods are designated as the item for the Recycle Law, and, in fact, recycled as the road pavement materials and cement materials.

The construction wasted goods are also designated as the recycling item in the Recycle Law, and the wasted cement-concrete, which is the largest wasted item, is recycled into the reproduced concrete.

The wasted plastic goods of industrial wasted items are said to be in general easier to recycle than those plastic wasted goods of general households in the city. They are made into materials of the reproduced plastic by pallets, and by either melting or processed made recycled into the materials either the construction or packing transferrable materials. In addition, the wasted plastic goods are made into RDF (solid fuels) or retrieved into oils and fats. However, the heat vulnerable plastics of ABC plastics and chlorided vinyl are not easily recyclable and need development of future study.

Remaining number of years for the final disposition

	1990	1991	1992	1993	1994	1995
Industrial wasted Goods	1.7	1.9	2.3	2.3	2.7	3.0
General wasted Goods	7.6	7.8	8.2	8.1	8.7	8.5

Sources: Ministry of Health and Welfare, Report on Exposition and Disposition of Industrial Wasted Goods, and Report on Exposition and Disposition of General Wasted Goods

2) General Wasted Goods and Recycling

According to the Welfare Ministry survey, the exposition of general wasted goods was 50,690 k/tons in 1995, the quantity is around the same since 1991. The flammable wasted goods are the largest portions of the general exposition goods.

The reduced ratio of garbage (ratio after the intermediary processing of burning, smashing or recycled into other materials) has been increasing, and reached to 88.5% at the year of 1995. By improvement of the disposition plants of wasted goods, the intermediary processing has been enhanced. The remaining ratio of 11.5% have been dumped onto the reclaimed land-area, and it's been declining each year. Among the reducing disposition of 88.5%, the direct burning down is 76.2%, the smashing, reproduction materialization of certain goods, and fertilization, etc are 12.3%.

In addition, the ratio of recycling has been increasing each year, it was 9.9% at the year 1995. However, comparing to 37% of the industrial wasted goods, the ratio must be said small yet.

There are 2,361 final disposition plants of the general wasted goods, the remaining number of years for the final disposition is 8.5 years and appears decline. The problem of remaining number of years is serious in the larger cities, and 7.1 years in Kinki region, and 4.8 years in the metropolitan area.

Among the general wasted goods, the most problematical wasted goods, today, are the wasted goods of packing and wrappings (of paper, plastic, pet bottles, bottles and cans), kitchen garbage, old papers, and mechanical goods (home elec/electro goods) etc.

Regarding the general wasted goods, by implementation of [Packing Wares Recycling Law], the selective collection of the bottles and pet-bottles is the responsibility of the local community governments, and recycling is responsible by the expositioning firms and shops. Regarding the selection of glass colours and respective disposition are necessary, and development and operations of the selection machinery equipment are working by the optical sensor and/or visual processing.

Regarding the pet-bottles, the industrial federation of soft drinks, the industrial federation of pet-bottle makers, and the federation of wasted goods dispositioning industry have jointly established a pet-bottle re-processing company and manufacturing the reprocessed recycling carpets and the reprocessed textile materials.

From the year 2000, regarding the [Miscellaneous Paper Wares and Wrappings] excluding the paper wares of soft drinks, [Miscellaneous Plastic Wares and Wrappings] other than the pet-bottles, the selective collection and/or re-processing into reproduction are obliged in the Law. For this purpose in particular, development of recycling technology of the wasted plastics, which was taken quite difficult, and developing into to produce the reprocessed oils, gas and RDF(solid fuels).

Regarding the household garbage, at the present time, even though the ratio of selective collection and recycling are yet lower, for waterage and saltage in the household garbage, the extermination by burning will radiate the dioxine, and the material recycling of them is very important. The present usage of recycling of them are the fertilizer, refertilization of the reclaimed land and the forages, and establishment of network between the demand and supply is a matter of important issue. Beside the household garbage, the garbage out of hotels, discount shops and first food firms are getting to be processed by the garbage disposition equipment, and the local community governments are establishing the large scale disposition plants.

Regarding the used papers, at the present time, the storage of used paper by the wholesaler firms are getting over their capacity, and the market price is declining. For usage as the material of processed papers, there is a certain limit, and development of other usage such as the construction materials, pet goods (as floor sand for cats) and radiation into the material of farm soils are getting under study.

Regarding the used waste goods of home elec/electro machines, the present disposition method (of shredding into pieces and recollection of rare steels) produce the shredded dusts and, in principle, dumped into the reclaiming land. Liquidation of shredded dusts, sarmal recycling,, high tech-processing and regular recycling are being developed by joint work of the makers and Home Elec/Electro Products Association. From the year 2001, the [Specified Home Elec/Electro Appliances Re-cycling Law] is going to be implemented. For the present time, four items of TV, Refrigerator, Washing Machine and Air Conditioners are the responsibility of take-over and/or recycling are held responsible to the manufacturers, importers and retail sellers.

3) Exposition Disposal and Recycling Industry

The market volume of wasted goods disposal and recycling is estimated at ¥8.95 trillions (according to the [Industrial Environment Vision Report 1994] by the Industrial Structure Council), of which ¥3.8 trillions by the wasted goods disposal industry and ¥5.1 trillions by the recycling industry.

The number of wasted goods disposition firms in Japan is 15,568 firms at the year 1996 (according to Business Census Statistics, issued by Management and Coordination Agency. Among which, the general waste goods disposition firms are 70% and 30% by the industrial waste goods disposition firms. The industrial growing ratio during past 10 years, the industrial waste goods disposition firms are growing double.

Regarding the industry of the waste goods disposition firms, among the general waste goods disposition and the industrial waste goods disposition, there are both intermediary firms of the collection and trucking firms and disposition firms(intermediary disposal and final disposal) and can be characterized as follows;

Among the firms, the number of collection and trucking firms is the largest number (regarding the industrial waste goods disposal license, 92% is for the collection and trucking). The reason for this is that easier for obtaining license for the collection and trucking and need less initial capital investment, and also easier to go into the business. Even though lesser number of the disposition firms, the approval for license of new establishment of the intermediary and final disposal is getting difficult, and harder is it, the edge of profit is larger than the collection and trucking firms. However, the size of firms is generally large to secure large space and disposal equipment and need in general larger capital investment than the collection and trucking operations. For both the collection and trucking operations and the disposal operations, there are only a few nationwide covering firms but closely tied to the local community. In particular, the license approval of general waste goods is issued by the local government and has a larger trend.

2. Market Prospects

In a report titled, "Vision of the Industrial Environment", which was drafted in 1994 by MITI's Advisory Committee on Industrial Structure, the market size of the environmental protection industry was predicted to reach 23 trillion yen in 2000 and ¥35 trillion in 2010. Also, the "Program for Reform & Creation in the Economic Structure", which was adopted by the Cabinet in 1996, treats the environment-related field as one of Japan's new and growing fields, and projects a market size of ¥37 trillion with employment of 1.4 million people in 2010. Both estimates, coincidentally, regard the environmental protection industry as having a market in which future growth can be expected.

In the "Vision of the Industrial Environment", the waste goods disposal and recycling field is designated the waste goods disposition and recycling business, and central business in view of the environmental business. According to the report, it is forecasted for the business of the waste goods disposition are estimated at ¥5,260 billion by the year 2000 and ¥7,260 billion in 2010, and for the recycling business at ¥7,280 billion in 2000 and ¥10,570 billion in 2010, and the total market combine will be ¥18,000 billion by the year 2010, and will share more than 50% of the total environment business.

Estimated Market Size of Environmental Service Businesses

(Unit: billion yen)

	Present	2000	2010
Total market size	15,290	23,280	35,020
	(annual rate 6% •	(annual rate 4%)	
1. Environment support-related field	1,340	2,000	3,480
2. Waste disposal & recycle-related field	10,930	16,170	22,800
Waste goods disposition business	3,830	5,260	7,260
Recycling business	5,120	7,280	10,570
Distribution of used goods and repairing business	1,980	3,630	4,970
3. Environment recovery & restoration-related field	870	1,450	2,430
4. Environment-conscious energy-related field	1,940	3,130	4,020
5. Environment-conscious product-related field	230	550	2,320
6. Environment-conscious production processing-related field	•	•	•

Source: "Vision of the Industrial Environment" (June 1994), released by the Advisory Committee on Industrial Structure

Regarding the future of the waste goods disposal business & recycling, it will be affected by the future policy & regulations.

1) Industrial Waste Goods

With effect from the year 2000 under the [Recycling Law of Packing-wares], the plastic packing wares (except the pet bottles) , the plastic trays of super market and discount shops, the packing-wares of forming stilrolls must be recycled, and the recycling equipment concerning about them will bring growth of business about them.

In addition, the technology of selection and choice of the materials for the commercial recycling and from the waste goods of different materials to separate the pricing materials or the poisonous materials will be developed as necessary industrial technology, and the business growth for this is highly expected. At the present time, selection technology of the steel/irons and aluminum are fairly developed. In the near future, the technology for selection and equipment improvement of (the combined material plastics and chloride vinyl) is considered to be developed.

2) General Waste Goods•

From the year 2001, the [Home Elec/Electro Appliances Recycling Law] will take effect, and TVs, refrigeraters, washing machines and air conditioners(4 items) being designated items, the home elec/electro makers are required to establish recycling corporate plan and LCA.

Of which disassemble, re-cycle of used parts, smashing-selection-retrieval of rare metals for another use will become future growth business.

The household garbage are possible for change into the fertilizers, and more establishments of the garbage processing plants by the local community governments will be accelerated in the near future. In Tokyo, the garbage out of the companies are collected by payment, and the establishment of garbage processing equipment of hotels, restaurants, discount shops and etc are increasing, and other large cities will also follow the case and will provide a large business opportunity. In the future, with the development of the processing machines and equipment of the household and companies, the collection of garbage, fertilization for farming and subsequent supply to the farmers will become good business.

The used waste papers, being over supply and the price of which declining, in stead of the use of reprocessed paper, the technology of recycling and acquirements can be developed for use of the construction materials.

3. Related Regulations

The Basic Law on the Environment

As for Japanese regulations concerned with environmental issues, the Basic Law on the Environment was enacted in 1993 after a review of the Public Pollution Prevention Law and the Natural Environment Preservation Law to accommodate the 1992 Rio Declaration, which came out of the United Nations Conference on Environment Development (Global Summit) held in Brazil. The declaration addresses the need for global environmental preservation for future generations and calls for implementation sustainable development principles so the environment can be preserved while economic development continues. The declaration defines the progressive responsibility for environmental preservation by each national and local government, as well as commercial entities and national peoples.

In the field of the waste treatment and recycling, under the Environment Fundamental Law, there are various laws to cover [The Act Concerning Waste Disposal and Cleaning (Waste Cleaning Act)], [Law concerning Promotion of Effective Material Recycling] and [Law concerning Promotion of Selection and Recycling of Packing-wares]

Law Concerning the Disposition and Cleansing of Wastes

The Law Concerning the Disposition and Cleansing of Wastes establishes responsibility and regulates the disposal systems, management systems, etc. of various entities. The items covered by the regulation include solid and liquid wastes, but radioactive waste, gases, and sand are excluded.

The law classifies 19 industrial waste items, the disposition of which is controlled. The law prohibits the dumping in landfills or the sea of certain substances. The substances include polluted mud, mineral wastes, certain nonincinerated materials, certain particulate, oxygenic waste and alkaline waste, and 10 substances defined as hazardous, namely, mercury, cadmium, copper, hexavalent chromium, arsenic, cyanogen, organic phosphorus, PCB, trichloro-ethylene, and tetrachloro-ethylene. In general, the substances listed above are treated as hazardous waste.

Amendments were made to the law in June 1997, with revisions put into force one after another. The amendments had as major objectives the reduction of waste, the deregulation needed to promote recycling, the requirement of environmental impact surveys (environmental assessments) prior to construction of new garbage incineration plants, the proper management of waste processing plants, and the appropriate punishment for illegal dumping.

Law Concerning Promotion of Material Recycling

The Law was stipulated for the purpose of effective use of the materials and for preservation and reduction of the sources of waste goods and promotion of voluntary effort of exposition shops and firms of production, distribution and consumption, and for purpose of promotion of development of national economy to constitute the recycling industrial society. 7 Ministry Ministers will make judgement and publish the basic policy of effective promotion of the recycling materials, (2) and designate each responsibility of National Government, Local Governments, Corporations and Consumers to share and co-operation responsibility, (3) and to take individual policy of each firm, each production and sub-products. In regard to the responsibility of (3) shops and firms, the judgement standard of setting up recycling plan, and careful study of materials and structure for products of Group 1 products, and labeling of the possible recollection of Group 2 products.

The Waste Goods Law covers mainly the down-stream of selection, storage, collection, transportation, recycling and disposal. The Recycle Law will on the other hand covers the up-stream of development, planning and use of the waste goods.

Law Concerning Promotion of Selection and Re-Merchandisation of Packing-Wares

The Law was stipulated for the purpose of safety preservation of living environment by promotion of establishing recycling system for effective re-usage of the materials of the waste goods. Regarding the waste packing-ware goods of household, it clears the responsibility of consumers (disposalists), local community governments (collectors), shops and firms (for recycling).

Legal enforcement became effective from April 1997 for those waste goods of glass bottles, steel cans, pet bottles and paper wares of soft drinks (paper pack) (except those commercial items of irons/steels and paper-wares are exempted from collection responsibility of sellers). In addition, with effect from April 2000, the plastic packing-wares other than paper packing-wares excluding soft-drinks and pet bottles are included into the specified items of waste goods.

This Law is already applied to the large firms and corporations from April 1997, and further include the small and medium firms and corporations from April 2000. This Law is said to be an epoch-making law in the points implementing economical factors into the environmental issue and clarifies the responsibility of each concerned party.

Law Concerning Re-Merchandization of Specified Home Elec/Electro Appliances (Home Elec/Electro Appliances Recycling Law)

This Law will become effective from April 2001, and wherein by designating four products of TVs, Refrigerators, Washing Machines and Air Conditioners, rests the responsibility of manufacturers, importers and sellers for recollection of their products and shares the responsibility of consumers for retrieval to the sellers for collection and re-merchandization.

The home electric and electronic appliances in the present time are made inclined to improve development of mechanical multi purpose efficiency, and complexes in the structures for containing many advanced parts and made for long mechanical durable life, and have deficiency for recycling. By the forthcoming enforcement of the Law, the manufacturers are required to develop products of easier recycling and lesser environment hazards.